climate change

RESEARCH INFORMATION NOTE

Note Number 2 2006

How OMNR Staff Perceive Risks Related to Climate Change and Forests

Stephen J. Colombo[1] Ontario Forest Research Institute, Ontario Ministry of Natural Resources, 1235 Queen Street East, Sault Ste. Marie, ON P6A 2E5

INTRODUCTION

The ability of an agency to address new challenges relies on the attitudes of its people. To deal effectively with emerging issues, an agency's staff must view the challenge as important, leadership within the agency must acknowledge the issue as a priority, and sufficient resources must be directed to educate staff and fund relevant initiatives. In addition, the workforce has to view the issue as solvable and believe that addressing it will be an improvement over the status quo.

Ontario's biodiversity strategy states that "climate change will increasingly impact biological diversity" (OMNR 2005a). The Ontario Ministry of Natural Resources (OMNR) is responsible for the management of 90% of the 79 million ha of forest in the province. Ontario's commitment to sustainable forest management requires that forests be managed to ensure that future generations can use and enjoy them (OMNR 2005b). However, climate change presents many challenges to sustainable management, since the long life of tree species and long rotation cycles mean that the effects of current land management decisions can persist for a century or more. Climatologists believe that climate change will occur rapidly during this century (IPCC 2001), but they are less certain about the timing and extent of the change, largely because the rate of greenhouse gas increase in the atmosphere depends on technological development and the behaviour of society in coming decades.

According to OMNR's strategic directions (OMNR 2005b), the ministry must try to address trends in climate change that are expected to cause more weather extremes and weather-related emergencies, such as drought, flood, and forest fires. One proposed action to maintain a healthy natural environment in Ontario is to "enhance MNR efforts to understand, mitigate impacts on biodiversity, and adapt to climate change" (OMNR 2005).

To gauge the perceptions of OMNR staff about climate change, a survey was conducted as part of a November 2005 meeting between Forests Division and Science and Information Resources Division. The survey was similar to one conducted as part of a climate change and forestry workshop in Prince George, British Columbia in 2003 (Williamson et al. 2005). The objective of the OMNR survey was to document staff perceptions of risks from climate change to forest ecosystems and forest-based communities in Ontario.

[1]Mailing address: Centre for Northern Forest Ecosystem Research, Ontario Ministry of Natural Resources, 955 Oliver Road, Thunder Bay, ON P7B 5E1

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METHODS

The survey was circulated to participants of OMNR's *Science Matters III*, held November 30, 2005, in Sault Ste. Marie, Ontario (Buse and Obenchain 2005). *Science Matters* meetings have been held annually since 2003 to "encourage forest policy-research dialogue and integration, profile current forest policy and research initiatives, and identify forest policy and research needs/gaps and possible solutions/actions" (Buse and Obenchain 2005). *Science Matters III* was attended by 81 OMNR staff, with representatives that can be categorized as coming from either offices that focus on forest resources management (Forest Management Branch, Industry Relations Branch, Aviation Fire and Flood Management Branch, and the Sault Ste. Marie District Office) or from branches whose primary responsibility is forest science (Applied Research and Development Branch and Science and Information Branch).

Participation in the survey was voluntary and anonymous, with surveys placed on tables before the start of the meeting. Respondents deposited completed surveys in a collection box throughout the day. The survey contained 30 statements about climate change, in 3 categories:

- General beliefs about climate change (8 questions)
- Perceptions of climate change as a risk to forest ecosystems (10 questions)
- Perceptions of climate change as a risk to forest-based communities (12 questions)

Respondents were asked to circle a number from 1 (strongly disagree) to 7 (strongly agree) indicating their level of agreement with a statement about climate change risk. In addition, respondents were asked to provide non-identifying information about the branch they work for, educational background (forestry, biology, or other), level of education (diploma, undergraduate or post-graduate degree), job category (manager[2] or bargaining unit position), and age (20-29, 30-39, 40-49, 50-59, or 60+). Sixty-three people completed the survey, a 78% response rate. Most respondents answered the entire survey and provided all of the non-identifying personal information requested. Fifty-seven of 63 respondents provided their age class. Only three people who responded said they were under the age of 30, while nearly 50% said they were 40-49 years (Figure 1). Sixty people identified their level of education: 95% had a university degree, including 43% who had a post-graduate degree. Nearly 10% of respondents did not indicate whether they were in a management or bargaining unit position; among the 57 people who indicated their status, 15 (26%) said they were in management.

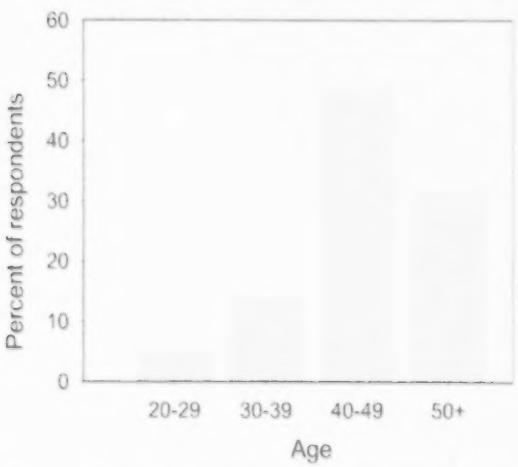

Figure 1. Age distribution of survey respondents. Six of the 63 respondents did not indicate their age.

Results are presented in terms of average rating by respondents as well as the percent of respondents agreeing or disagreeing with the statements. Average and standard deviation of responses to each question were estimated using SPSS software (Version 14.0). The "Crosstab" test in SPSS was used with the Chi-Square test to identify whether respondent classes (e.g., background, education, age, etc.) resulted in statistically significantly differences in responses for any question ($p<0.10$).

[2] *Manager* refers to a person with managerial duties within the OMNR. This position differs from *forest manager*, which refers to a person who is responsible for planning or executing forestry-related activities.

RESULTS AND DISCUSSION

Most of the survey respondents said they believed that climate change is real and requires action, and that the science of climate change is conclusive (Table 1). More than 80% of respondents agreed that human activities are a major cause of climate change (Question 8); however, 11% disagreed with this statement. Two thirds of the respondents did not feel that all climate change impacts will be negative (Question 6), but about half did not believe they understand what the impacts will be (Question 2). Most survey participants (66%) believed there is some urgency to begin adapting to climate change (Question 1).

Presenting the percentages of respondents who agreed or disagreed with each statement helps in the interpretation of results. For instance, an average rating of 4 may not indicate that the response to the question was neutral. Instead, as with Question 5, it can indicate that as many respondents agreed as disagreed with the statement. The fraction of responses that were neutral can be calculated based on the proportion that neither agreed nor disagreed with a particular statement.

Part B of the survey examined the perception of risk that climate change poses to forest ecosystems (Table 2). Just over half the respondents said they believed climate change is already affecting forest ecosystems

Table 1. General beliefs of OMNR staff about climate change. Standard deviations of means ranged from 1.0 to 1.5.

Question #	Statement	Rating*		
		Average	% agreeing	% disagreeing
1	There is ample time to adapt to climate change	3.1	19	66
2	I do not understand the impacts of climate change	3.6	27	52
3	Climate change impacts are exaggerated	3.0	11	66
4	Generally, the science of climate change is inconclusive	3.3	23	66
5	Climate change is a serious threat to my family and me	3.9	36	36
6	All climate change impacts are negative	3.1	14	66
7	I feel my family and I are prepared for climate change	3.3	6	63
8	Human activities are a major cause of climate change	5.6	81	11

*Respondents rated their perceptions based on a scale of 1 (strongly disagree) to 7 (strongly agree).

Table 2. Perceptions of risk posed by climate change to forest ecosystems. Standard deviations of means range from 1.0 to 1.7.

Question #	Statement	Rating*		
		Mean	% agreeing	% disagreeing
9	Climate change is currently having a significant impact on forest ecosystems	4.6	56	22
10	Within the next 50 years climate change will significantly affect forest ecosystems	5.6	86	5
11	There is certainty about the effects of climate change on the sustainability of forest ecosystems	3.3	25	64
12	Forest managers have the ability to control climate change impacts on forest ecosystems	2.9	14	69
13	Climate change effects on forest ecosystems are predictable	3.3	25	61
14	Canada's forests will evolve and adapt in pace with climate change	3.8	36	50
15	The effects of climate change on forest ecosystems will be noticeable	5.3	78	13
16	Anticipated climate change impacts on forest ecosystems are acceptable to you personally	3.3	19	64
17	Effects of climate change on forest ecosystems are understood by the public	1.9	3	88
18	Effects of climate change on forest ecosystems are understood by forest managers	2.9	6	72

*Respondents rated their perceptions based on a scale of 1 (strongly disagree) to 7 (strongly agree).

(Question 9), and a large majority believed that it will significantly affect forests in the next 50 years (Question 10). Fifty percent of respondents indicated that they believed climate will change faster than Ontario's forests can respond (Question 14).

Respondents were not confident that forest managers understand how climate change will affect forests, rating their knowledge as only slightly better than the general public's (questions 17 and 18). Interestingly, respondents with a diploma or bachelor's degree were less confident that forest managers understand the effects of climate change on forests, while those with post-graduate education tended to be uncertain how well informed forest managers are about climate change (Figure 2). It could be that members of the latter group have less extensive contact with forest managers compared with those with bachelor's degrees or college diplomas.

Most respondents (61%) indicated they do not believe that climate change impacts on forest ecosystems are predictable (Question 13), and only 14% believe forest managers can control the impacts of climate change on forests (Question 12). Over 70% of those working in forest resources management did not agree that the effects of climate change on forests are predictable, while almost 40% of those in OMNR's science division believed the effects of climate change can be predicted (Figure 3).

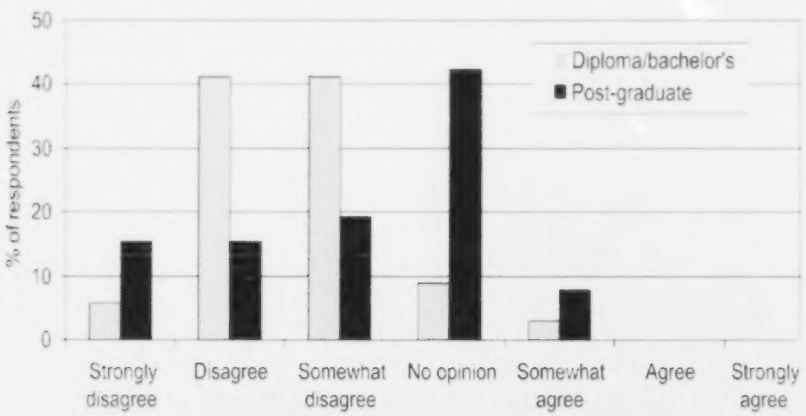

Figure 2. Effects of education level on respondents' perception of forest managers' understanding of the effects of climate change on forest ecosystems (Question 18). 34 respondents had either a college diploma or bachelor's degree, and 26 had post-graduate training. Responses of groups differ significantly according to Chi-Square ($p=0.036$).

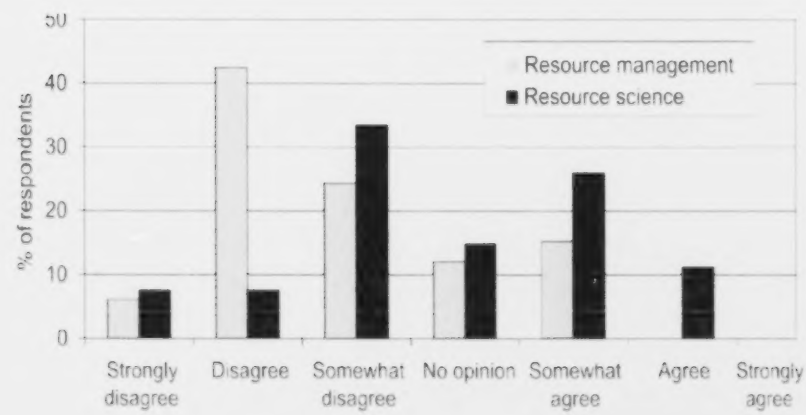

Figure 3. Relationship between respondents' workplace and opinion about whether the impacts of climate change on forest ecosystems are predictable (Question 13). 33 respondents work in forest management and 23 in science. Forest management respondents are from Aviation Fire and Flood Management Branch, Forest Management Branch, Industry Relations Branch, and the Sault Ste. Marie District Office. Science staff come from either the Applied Research and Development Branch or Science and Information Branch. Responses of groups differ significantly according to Chi-Square ($p=0.036$).

Part C of the survey explored the perception of risk that climate change poses to forest-based communities (Table 3). While about half the respondents believed that the impacts of climate change on forest communities will be significant (Question 20), nearly all strongly believed that forest policymakers and the public do not understand the effects of climate change on these communities (questions 27 and 28). Somewhat surprisingly, nearly 90% of respondents from forest resources management, some of whom are responsible for policy development in OMNR, did not believe that policymakers understand how climate change might affect forest communities (Figure 5).

Nearly three quarters of respondents believe climate change will increase economic uncertainty in forest-based communities (Question 30). However, respondents 40 years of age and older were more confident about forest-based communities than those younger than 40 (Figure 4). Most managers said they are unsure whether forest-based communities can adapt to climate change (Question 22), while almost half of the bargaining unit respondents do not think communities can adapt (Figure 6).

This survey of OMNR staff posed the same questions as a survey conducted at a climate change and forestry workshop that the Canadian Climate Impacts and Adaptation Research Network Forest Sector and the

Table 3. Respondents' perceptions of the risk that climate change poses to forest-based communities. The standard deviation of means ranged from 1.0 to 1.3.

Question #	Statement	Rating* Mean	% agreeing	% disagreeing
19	Climate change is a serious threat to forest-based communities	4.7	54	9
20	Impact of climate change on community well-being will be significant	4.8	52	8
21	Climate change impacts on forest-based communities are controllable through planning and preparation	4.1	41	37
22	Forest-based communities have the capacity to adapt to climate change impacts	4.0	38	37
23	Climate change effects on the well-being of communities are predictable	3.3	21	60
24	The effects of climate change on forest-based communities will be noticeable	4.9	65	16
25	Anticipated climate change effects on forest-based communities are acceptable to you personally	3.5	16	49
26	There is scientific uncertainty about the effects of climate change on communities	5.4	79	10
27	The effects of climate change on forest-based communities are understood by the public	2.1	3	90
28	The effects of climate change on forest-based communities are understood by forest policymakers	2.9	8	75
29	Climate change will present opportunities to improve well-being in forest-based communities	4.3	43	17
30	Climate change will lead to higher levels of economic uncertainty for businesses and firms in forest-based communities	5.2	71	11

* Respondents rated their perceptions based on a scale of 1 (strongly disagree) to 7 (strongly agree).

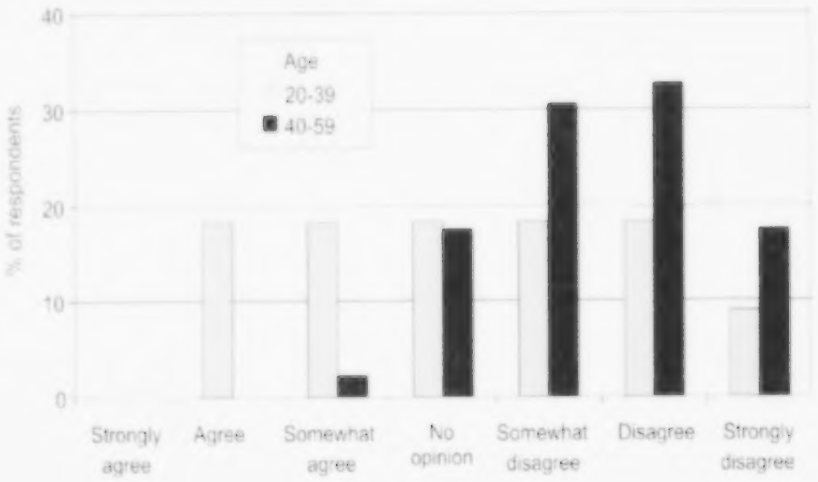

Figure 4. Effect of age on perception that climate change will create economic uncertainty in forest-based communities (Question 30). For respondents over 39 years of age, n=46, and for those 39 and younger, n=11. Responses of age groups differ significantly when tested by Chi-Square (p=0.002)

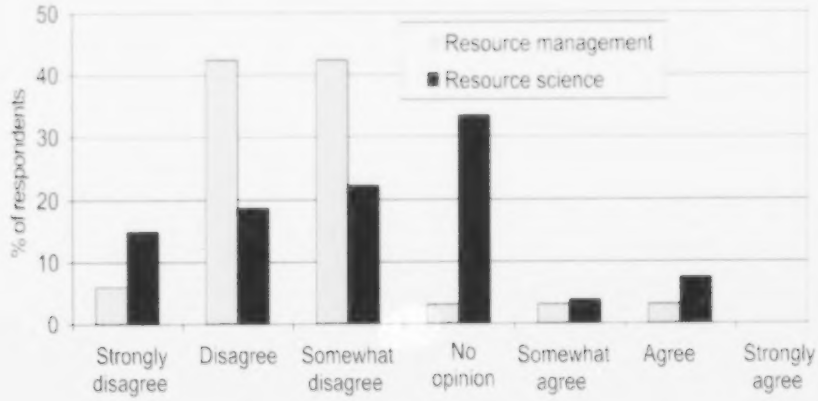

Figure 5. Relationship between respondents' workplace and their view of how well policymakers understand the effect of climate change on forest communities (Question 28). 33 respondents worked in forest management and 23 in science. Responses of groups differ significantly according to Chi-Square (p=0.013)

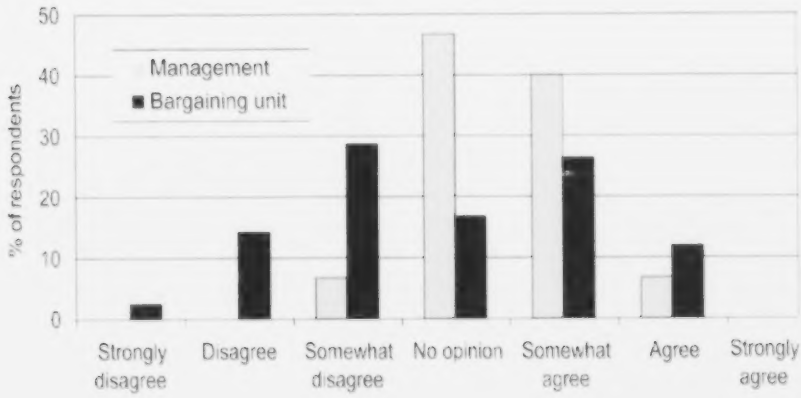

Figure 6. Responses of management and bargaining unit staff to the statement that "forest-based communities have the capacity to adapt to climate change impacts" (Question 22). Fifteen respondents were from management and 42 from the bargaining unit. Responses of groups differ significantly according to Chi-Square (p=0.071).

McGregor Model Forest hosted in 2003 (Williamson et al. 2005). Williamson and his coauthors note that their survey was limited to a small number of experts, mainly from British Columbia. They concluded that the survey should be repeated with forestry experts from other parts of the country (Williamson et al. 2005). The present survey helps address that need.

The results of the two surveys were mostly very similar, with the difference in rating of the 30 questions averaging 0.19. Several questions, however, elicited differences of 0.5 or more (Table 4). While both groups believed that climate change is already significantly affecting forests, B.C. respondents felt more strongly that this is true (Question 9 in Table 4). Four of the five questions that the groups answered differently were related to perceptions of risk of climate change to forest-based communities. In general, OMNR respondents believed that the public and policymakers are somewhat better informed about the effects of climate change on forest-based communities (questions 27 and 28). OMNR respondents believed that the risk that climate change poses to forest-based communities is significant (Question 19), while on average respondents in British Columbia did not agree with this statement (Table 4). Respondents in OMNR were more optimistic than respondents in British Columbia that climate change will bring opportunities to improve well-being of forest-based communities (Question 29).

CONCLUSIONS

One reason for conducting this survey was to gauge how OMNR staff perceive the seriousness of climate change as a forest management issue. This survey is the only documented perspective on the attitudes of OMNR staff regarding climate change. Additional staff in other OMNR offices need to answer the survey to determine how accurately the views tabulated here are shared by a broader cross-section of OMNR. Of those staff surveyed, over 80% indicated that they believe human activities are a major cause of climate change (Question 8). However, the responses to Question 8 also indicated that 11% did not agree that humans are responsible for climate change, and a further 8% were unsure whether human activity plays a part in it.

Table 4. Questions having the greatest difference in results in surveys of OMNR and British Columbia forestry experts.

Question #	Statement	Mean rating*	
		OMNR	Williamson et al. (2005)
9	Climate change is currently having a significant impact on forest ecosystems	4.63	5.32
19	Climate change is a serious threat to forest-based communities	4.71	3.23
27	The effects of climate change on forest-based communities are understood by the public	2.08	1.55
28	The effects of climate change on forest-based communities are understood by forest policymakers	2.89	2.00
29	Climate change will present opportunities to improve well-being in forest-based communities	5.19	3.75

* Respondents rated their perceptions based on a scale of 1 (strongly disagree) to 7 (strongly agree) with the following exceptions. For questions 27 and 28, Williamson et al. (2005) used a scale ranging from 1=not well understood to 7=well understood and for question 29 their scale was 1=no benefits to 7=significant benefits. While worded differently, an average value <4 in either survey indicates that on average the respondents disagreed with the statement and a value >4 indicates agreement.

In addition, about 25% of those surveyed said they believe the science of climate change is inconclusive (Question 4). In contrast, the International Science Academies of Canada and the other G8 Nations in a joint statement in 2005 (National Academies of Science 2005), say "We urge... prompt action to reduce the causes of climate change, adapt to its impacts and ensure that the issue is included in all relevant national and international strategies." Ongoing efforts appear to be needed to inform OMNR staff that the mainstream scientific community has moved beyond considerations of the likelihood of climate change or its cause.

A scan of most resource management journals will reveal that scientists are concerned about the impacts of climate change, as well as what actions are needed to adapt resource management to climate change and when it will be appropriate to implement such actions. The results of the OMNR survey show the importance of continuing to communicate information to staff about climate change's human-based cause and potential impacts.

Some OMNR staff surveyed are unsure of the importance of climate change to forests and forest-based communities. However, most believe that climate change will significantly change forest ecosystems and affect the communities that depend on them and that prompt action is required to address these impacts. These staff are a solid base on which to develop the means to adapt forests and forest-based communities to climate change.

ACKNOWLEDGEMENTS

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Comment le personnel du MRNO perçoit les risques liés aux changements climatiques et aux forêts

La présente note résume les résultats du sondage effectué après d'un groupe de membres du personnel du MRN afin d'évaluer quelle importance ils accordent aux changements climatiques comme enjeu dans l'aménagement forestier. Mentionnons, entre autres résultats : parmi les membres du personnel qui ont répondu au sondage, plus de 80 % ont indiqué qu'ils croient que les activités humaines constituent l'une des principales causes de changements climatiques, mais environ 25 % ont déclaré que la science liée à ce domaine ne semblait pas concluante. Alors que certains membres du personnel du MRNO interrogés ne sont pas certains de l'incidence que peuvent avoir les changements climatiques sur les forêts et les collectivités forestières, la plupart sont d'avis que les changements climatiques peuvent altérer de façon significative les écosystèmes forestiers et affecter les collectivités qui en dépendent pour leur survie, et qu'il faut agir promptement pour y faire face.

Cette publication hautement spécialisée *How OMNR Staff Perceive Risks Related to Climate Change and Forests* n'est disponible qu'en Anglais en vertu du Règlement 411/97 qui en exempte l'application de la Loi sur les ser les services en français. Pour obtenir de l'aide en français, veuillez communiquer avec au ministère des Richesses naturelles au information.ofri@mnr.gov.on.ca

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